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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/803,910	03/19/2004	Seiichi Higaki	ASAM.0115	6368

7590 02/02/2006

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EXAMINER	
PATEL, KAUSHIKKUMAR M	
ART UNIT	**PAPER NUMBER**
2188	

DATE MAILED: 02/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/803,910	HIGAKI ET AL.	
	Examiner	Art Unit	
	Kaushikkumar Patel	2188	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 December 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/8/05* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/8/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on December 8, 2005 has considered by the examiner.

Response to Amendment

2. This Office Action is in response to applicant's communication filed December 8, 2005 in response to PTO office action mailed September 8, 2005. The Applicant's remarks and amendments to the claims and/or the specification were considered with the results that follow.

3. Claims 1-20 have been amended. No claims have been canceled. No claims have been added. As a result, claims 1-20 remain pending in this application.

4. The objection of the claims has been withdrawn due to the amendment filed December 8, 2005.

5. The rejection of claims 4-5 and 14-15 is respectfully maintained and reiterated below for Applicant's convenience.

6. The objection to specification is respectfully maintained and reiterated below. Applicant just corrected objections presented to in prior office action as a sample. The whole specification was not checked for possible errors. Examiner respectfully seeks applicant's cooperation to correct any other possible remaining errors in the specification.

Response to Arguments

7. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

Specification

8. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

9. A substitute specification in proper idiomatic English and in compliance with 37 CFR 1.52(a) and (b) is required. A statement that it contains no new matter must accompany the substitute specification filed.

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

11. Claim 4-5 and 14-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 4-5 and 14-15, it is not clear what is being claimed. For example, it is not clear what "one' refers to in line 2 of each of claims 4-5 and 14-15.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guha et al. (US 2004/0054939 A1) (Guha herein after).

As per claim 1, Guha teaches a storage control device (fig. 1, item 30) comprising:

a channel adapter which is operatively coupled to the upper device, provides logical volumes for the upper devices and receives data which are sent from the upper device to the upper logical volumes (taught as provides connection between host devices and disks (fig. 2A, item 120, paragraph [0068]) and disks are arranged in redundant arrays of independent disks (RAID) pairs (fig. 1, items 50 and 60) and controller provides logical volumes to the hosts (paragraph [0149]), which inherently teaches a providing logical volumes to upper devices),

a memory which is operatively coupled to the channel adapter and stores the data transferred between the upper device and the memory, control information with respect to the data transferred between the upper device and the memory, and configuration information with respect to the configuration of the storage control device (Guha teaches a metadata volume used for I/O operations and disk drive operational transactions such as power up, power down, sparing etc. (paragraph [0114]). Guha also

teaches a storage system with RAID sets with virtual volume provided by rack controllers (paragraphs [0148] and [0167]). Thus, Guha inherently teaches a memory to store volume mapping tables and configuration information (related to disk drive operations) coupled to controller to manage configuration information and metadata volume information),

a disk adapter which controls reading and writing the data, which are sent from the upper device to the upper logical volumes, from on to the memory as being sent to a logical volumes at least one of the which is mapped to one of the upper logical volumes and is used as a storing region for transmission and reception of the data between the channel adapter and the disk adapter, an interconnection device which operatively couples to the channel adapter, the memory and the disk adapter, a plurality of disk drives, which are operatively coupled to the disk adapter, in which the data for the inner logical volumes are written by control of the disk adapter as a data group having a redundant relation, wherein a first inner logical volume of the inner logical volumes is mapped to a first upper logical volume of the upper logical volumes (Guha teaches use of magnetic disks as a storage devices as a subsets (volumes) (paragraph [0065]). Disk drives known to be control by disk adapters and data are presented to host as virtual volumes (RAID) (paragraph [0149], which inherently teaches that upper devices (host) writes to upper logical volumes (presented by controller) and controller maps it to corresponding inner logical volumes. It is also known that host accesses the data using virtual address and controller maps corresponding physical volume to particular logical volume),

Guha explicitly fails to teach sending change-over command to change the mapping between volumes (e.g. from logical group 50 to logical group 60 in fig.1), but Guha teaches that logical volume groups can be selectively powered on, when they are accessed and powered down when they are not accessed by the host (paragraphs [0065] and [0133]-[0136]). Guha also teaches that the configuration information regarding I/O operations and disk drive operational transitions (i.e. powering up or down etc.) are kept as metadata (mapping tables). So, in order to access or to power up other volume group and to power down the current volume group (which will not be used), one have to access the configuration information from the metadata volumes, which inherently teaches utilizing logical volume for control to change volume mapping as well to power up and power down respective disk drive groups.

It would have been obvious to one having ordinary skill in the art at the time of the invention would have modified the storage system of Guha by providing a change-over command (or instruction, as computers needs a command or set of instructions to perform any task) to power on (operate the spindle motors of the disk drives) the set of disk drives (volume group) to access those disk drive groups.

As per claim 2, Guha teaches that the disk drive group, which was previously accessed by the host, is powered down after mapping change to access a new volume group (paragraph [0133]-[0136], taught as single disk drives, but as mentioned in fig. 1 and in paragraph [0133], a container can be a single disk or multiple disk volumes).

As per claims 3,4, and 5, Guha teaches that the disk drive group which is not used, is powered down (see abstract and paragraphs [0065] and [0133]-[1036], taught

(with regards to fig. 8) as when container 0 (single or multiple disk volume) is written or read (which is mapped to disk drive 1), the only disk drive that is powered on is disk drive 1). Guha maintains all virtual to physical volume mapping information and disk operational activities (powering on and off) as a metadata volume (paragraph [0114] and [0149]). It would have been obvious to one having ordinary skill in the art at the time of the invention would have accessed the metadata volume information to determine whether the volume group is being used or not used. And after the determination, if it is judged that mapping to new volume group is accessed by other host then the disk spindles are spinning and there is need to stop the spindles of newly mapped disk volume group and if there is no existing mapping relation than, those disk drives were not in use and hence were stopped. So, in order to access newly mapped volume group one have to send command to power up the disks of the newly mapped volume group (claim 3). Similarly for claim 4, if after changing mapping to access new disk volume group, one has to make determination, whether previously mapped volume group is now not used by any other host before being powered down (as Guha teaches that disk group that is not in use will be powered down) and if previously mapped volume group is being accessed by other host (mapped to other host) than the disk drive kept running, and if volume group is not accessed by any other host than it is powered down (claim 5).

As per claim 6, Guha teaches a storage system with virtual volumes and all the mapping information related to I/O operation and disk operations (on/off) is kept as metadata (paragraph [0114]). Guha inherently teaches that all the metadata information

has to be updated (related to powering on and off the disk drives as well as volume mapping changes) and thus to update the metadata volume regarding powering on newly mapped drive and powering down previously mapped drive inherently teaches write command (updating of metadata volume information as one volume group is powered down and other volume group is powered up) as a indication of change-over.

As per claims 7 and 10, Guha teaches that one volume group is (written to or read from) is powered on and the other volume group is (not being used after volume change) is powered off (see abstract). It is inherent that the system distinguishes between the command sent from host as reading data from volume groups or reading configuration information from metadata volume in order to change mapping relation to access different volume group than currently mapped volume group to host.

As per claim 8, Guha teaches a metadata volume to perform mapping change (paragraph [0114]).

As per claim 9, Guha teaches selectively powering on disk volume group, which is being used and powering down disk volume group, which is not used as explained in claim 1, above which inherently teaches power control device to control power supplied to disk spindles.

Claims 11-20 are also rejected under the same rationales as applied to the claims 1-10 above.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Li et al. (US 2002/0144057 A1) teaches a disk-based storage system with power controller to individually power on and power off disk spindles.

Nelson et al. (US 6,857,057 B2) teaches a virtual storage system with channel adapter providing mapping tables to the hosts.

Jacobson et al. (5,392,244) teaches array controller which provides two different volume groups that stores frequently used data in one volume group and less frequently used data in other volume group and managed those volume groups by virtual mapping tables.

Pesola et al. (US 2003/0126327 A1) teaches a volume mapping apparatus that dynamically changes mapping between volume groups.

Raz et al. (5,860,137) teaches a method of sending connect and disconnect commands to map different volume groups.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaushikkumar Patel whose telephone number is 571-272-5536. The examiner can normally be reached on 8.00 am - 4.30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on 571-272-4210. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kaushikkumar Patel
Examiner
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kmp

Kevin L. Ellis
Primary Examiner